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ABSTRACT

This paper suggests a new approach to attitude scale construction. Instead of asking respondents to express the extent or the degree of opinion on a particular issue, respondents should be asked about the factors that are relevant for the issue of interest and how much weight respondents are willing to attach to each relevant piece of evidence. This approach emphasizes the decision-making process respondents utilize in the formation of attitude toward a particular issue. The paper presents the theoretical framework underlying the approach and an application of the proposed scale method. The approach was applied to attitudes toward abortion held by 111 graduate students, staff, and faculty at a university in the Southeast. The survey instrument asked respondents to indicate the amount of influence each factor would have on the decision to be for or against abortion. In this way, respondents are not required to judge the degree of agreement with a declarative statement, and the attitude scale represents a rational decision-making approach. The scale takes the individual's life experience into account and derives the continuum of the attitude being examined. In fact, the middle of the scale is neutral when respondents' attitudes are normally distributed. In addition, the level of attitudes among respondents can be compared. (Contains 1 table, 2 figures, and 30 references.) (SLD)

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A Different Approach to Attitude Scale Construction

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A Different Approach to Attitude Scale Construction[1]

While early researchers (Thurstone, 1929; Likert, 1932; Ferguson, 1941; Edwards, 1946; Guttman, 1944) proposed different procedures for constructing attitude scales, Likert-type or summated rating scales became a very popular choice among researchers. Likert-type scales are used to measure peoples' attitude toward a given topic or some issue. Typically, a Likert-type item is presented as a declarative statement followed by response options to indicate varying degrees of agreement with or endorsement of the statement. Over the years, researchers continued to examine Likert-type scales from many different perspectives. The following questions were raised: 1) what is the length of the scale? (Edwards, A. L. 1946; Cronbach, 1946; Dobson & Mothersill, 1979; Rasmussen, 1989; Schiel & Shaw, 1992; Spector, 1976; This Author, 1995) 2) what does the midpoint of the scale represent? (Guy & Norvell, 1977; DuBois & Burns, 1975; Rosenberg, Izard & Hollander, 1954; Cronbach, 1946; Worthy, 1969; Diab, 1965; Komorita, 1963) and 3) are the units of measurement ordinal or equal-interval? (Bernstein, 1996; Cheung & Mooi, 1994; Hofacker, 1984; Cooper, 1976; Lee & Brann, 1994). These questions surface intermittently, which indicates that these questions continued to create debate among researchers and laymen. These ambiguities stem from the traditional approach researchers have followed in scale construction--the use of expression of opinion as the basis for the construction of attitude scales. Thurstone & Chave (1929) asserted that,

> The concept *opinion* will here mean a verbal expression of attitude. If a man said that we made a mistake in entering the war against Germany, that statement would be called his opinion. The term *opinion* will be restricted to verbal expression. But, it is an expression of what? It expresses an

[1]I highly appreciate Ronald Lindahl's comments on an earlier draft of this paper. Maggie Wyatt's assistance in preparing this paper is thankfully acknowledged. I am responsible for any remaining errors.

> attitude, supposedly. There should be no difficulty in understanding this use of the two terms. The verbal expression is the opinion. Our interpretation of such an expressed opinion would be that the man's attitude is pro-German. An opinion symbolizes an attitude (p. 7).

This paper suggests a new approach to scale construction. Instead of asking respondents to express *the extent or the degree of opinion* on a particular issue, respondents should be asked about the factors that are relevant for the issue of interest and how much weight respondents are willing to attach to each relevant piece of evidence. This approach emphasizes the decision-making process respondents utilize in the formation of attitude toward a particular issue. This paper presents the theoretical framework underlying this approach and an application of the proposed scale construction method.

Theoretical perspective

Is there anything common among ideas, feeling, opinions, and views? How are they related? Attitude represents an evaluation of synthesized ideas, opinions, or views of an individual on a given issue. According to Thurstone & Chave (1929),

> The concept "attitude" will be used here to denote the sum-total of a man's inclinations and feelings, prejudice or bias, preconceived notions, ides, fears, threats, and convictions about any specific topic. Thus a person's attitude about abortion means here all that she/he feels and thinks about life and well being of humans. It is apparently a subjective and personal affair (pp. 6-7).

What Thurstone and Chave (1929) referred to as the "sum-total of a man's inclinations and feelings" represents an individual's synthesis of her/his life experience. In common usage, we often hear the expression, "Make up your mind." To make a decision, one has to 'synthesize' her/his ideas and evaluate them. According to John Locke (1632-1704), the mind is made up of ideas. Ideas come from experience. So, at the time of birth, the mind is a *tabula rasa*, a blank tablet, and experience accumulates on it. In Locke's

(1689) words, "The senses at first let in particular ideas, and furnish the yet *empty cabinet*, and the mind by degrees growing familiar with some of them, they are lodged in the memory, and names get to them." (Italics mine). The mind is what it experiences. As human beings progress from infancy to the time of death, they gather a repertoire of knowledge, skills, and experiences. This repertoire is built through various means: human interactions, education, environment, life events, societal events, culture, politics, religion, and various other factors. As a function of this repertoire of evidence, people form opinions on various issues they confront. The relative significance of pieces of evidence can change or oscillate between any two points in time as a function of an individual's *life-conditions*. Furthermore, the amount of evidence and the significance of each piece of evidence differ among individuals in the process of forming opinions. Perhaps, this is what Thurstone and Chave (1929) meant when they stated that attitude is a "subjective and personal affair."

Rationale for the Scale

How does an individual, S_i, make up her/his mind on a particular issue? When S_i decides whether she/he is for or against abortion, does she/he make that decision arbitrarily or does she/he consider some factors relevant for this issue? In general, when people take a position on an issue they carefully consider all the relevant information and weigh that evidence appropriately. Depending on the final tally of the weighted pieces of evidence for and against, S_i declares her/his position. This, I define as rational behavior. For example, Shawn Pogatchnik (1995), an Associated Press writer, reporting on the recent Irish election on legalizing divorce enumerated the following:

> "I only made up my mind this morning," said Emily Brannelly, a mother of seven who runs a guesthouse in the family home. Her husband planned to vote "yes," she said, as did her three sons, who liked the idea of legal divorce "so that they could just ditch the girl when things get boring or rough." But her daughters would vote against it, she said. Her own "no" vote came after much **deliberating**, Brannelly said minutes after casting her ballot at

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> Convent Road in suburban southern Dublin. "I gathered up all the '**pro**' and '**anti**' literature and gave it a good read over breakfast," she said (emphases mine).

Emily Brannelly has explained succinctly the decision-making process she followed. This decision- making process is the basis on which this theoretical model is formulated. Theoretical explanation of the decision-making process that an individual, S_i, utilizes can be represented as follows:

$$D_i = f(X_j) = (d_{i+}) + (d_{i-}) \qquad (1)$$

where D_i = decision and it includes two components, d_{i+} and d_{i-}

d_{i+} represents the sum of the weighted-positive pieces of evidence

d_{i-} represents the sum of the weighted-negative pieces of evidence.

X_j = a piece of evidence where $j = 1, \ldots, k_1$ (positive pieces of evidence) or k_2 (negative pieces of evidence)

The general form of the component d_i in equation (1) can be expanded in the following manner:

$$d_{i+} = \sum_{I,\, j=1}^{K_1} w_i (+X_j) \qquad (2)$$

where

where w_i = the amount of weight S_i attaches to a positive piece of evidence, $+X_j$

k_1 = the number of positive pieces of evidence.

$$d_{i-} = \sum_{I,\, j=1}^{K_2} w_i (-X_j) \qquad (3)$$

where

where w_i = the amount of weight S_i attaches to a negative piece of evidence, $-X_j$.

k_2 = the number of negative pieces of evidence.

Assumptions:

1. At any given point in time, there is a finite collection of pieces of evidence in the universe of X where

$$X = \sum_{J=1}^{n} X_j \qquad (4)$$

2. The universe of X changes as a function of time. In the short-run, the universe of X is assumed to be constant.

3. Each piece of evidence, X_j, represents one unit of evidence.

4. For an individual, S_i, only a subset of X may be applicable for the issue in question. That is:

$X_k \subseteq X$

5. In the short run, for an individual, S_i, the subset X_k is assumed to be constant.

6. In the long run, for an individual, S_i, the subset X_k can change as life conditions change.

7. For an individual, S_i, an applicable and relevant piece of evidence, X_j influences either positively or negatively in making her/his decision on the issue at hand.

8. For an individual, S_i, the value of k_1 is equal to total the number of appropriate and relevant positive pieces of evidence, and the value of k_2 is equal to the total number of appropriate and relevant negative pieces of evidence.

9. There is a set of weights, w_i, which is of equal interval. An individual, S_i, assigns relevant weights, w_i, to each X_j, depending on her/his life experience.

10. An individual, S_i, exercises total freedom in making her/his decision.

The decision-making process:

In this model, when an individual, S_i, wants to "make up her/his mind" S_i goes through *a process of mental walks* similar to the following:

1. identifies *all pieces of evidence*.
2. classifies all pieces of evidence as relevant, irrelevant, or tangentially relevant.
3. examines carefully, piece by piece, all tangentially or partially relevant pieces of evidence for issue-at-hand and determines their relevancy.
4. discards all irrelevant pieces of evidence for issue-at-hand.
5. classifies all relevant pieces of evidence into two groups--positive pieces go to the *positive pile* and negative pieces go to the *negative pile*.
6. attaches an appropriate weight (w_i) to each piece of evidence in each group based on S_i's *accumulated wealth of experience*, which is a function of factors such as level of education, upbringing, life experience, prejudices, and so on.
7. adds all the weighted pieces of positive evidence--equation (2).
8. adds all the weighted pieces of negative evidence--equation (3).
9. adds the positive and the negative sums of evidence. That is:
   $(d_{i+}) + (d_{i-})$ in equation (1).
10. based on the final outcome in #9 above, S_i declares her/his decision--for, against, or neutral toward the issue of interest.

In general, this decision-making process yields basically three different outcomes:

O_1: $D_i = +$, where $d_{i+} > d_{i-}$

O_2: $D_i = -$, where $d_{i+} < d_{i-}$

O_3: $D_i = 0$, where $d_{i+} = d_{i-}$

In outcome O_1, the decision of S_i is in favor of the issue being considered. In outcome O_2, the decision of S_i is against the issue being considered. In outcome O_3, the decision of S_i is rather neutral--neither in favor of nor against the issue being considered. These three possible outcomes have long been recognized in the traditional approach to attitude scaling. For example, Edwards (1957) enumerated that,

> By means of direct questions we might be able to classify individuals into three groups: those with favorable attitudes, those with unfavorable attitudes, and those who say that they are doubtful or undecided about their attitudes toward the object. (p. 3)

In the context of the traditional approach to attitude scaling, questions on O_3 continue to emerge--whether O_3 represents a part of the continuum of O_1 and O_2 and whether O_3 violates the unidimensionality of an attitude scale (Cheung & Mooi, 1994). This difficulty is an artifact of the traditional approach to attitude scale construction--expressed opinion as the basis for attitude scaling. The questions regarding O_3 can be answered satisfactorily in the proposed attitude scale construction procedure.

The process of *mental walks* explained here might seem arduous and cumbersome. Nevertheless, when an individual makes decisions on various issues, she/he goes through a similar process if not exactly as meticulously as I have described here. The process described here represents a theoretical framework to explain rational human decision-making processes. In constructing an attitude scale, instead of asking respondents to recapitulate this decision-making process, an instrument can be created as an aid to emulate the decision-making process. To do this, one has to identify as many factors as possible that may have an impact on the issue on which she/he is trying to measure people's attitude. The respondents are asked to identify each piece of evidence as to whether it affects positively of negatively or not relevant for the issue being considered. Furthermore, respondents should be given an opportunity to add additional factors, X_j, if they wish. A number of blank items can be included toward the end of the items and respondents should be

instructed to insert the stem of each item they would like to add. If a given factor influences in the affirmative, then a respondent selects the box marked with *for*. Alternatively, if a given factor influences in the negative, then a respondent selects the box marked with *against*. Finally, a respondent is asked how much weight she/he is willing to attach to a given piece of evidence in forming her/his opinion toward the issue under consideration. A respondent is given the information that the weights are of equal measurement units. If a given factor is irrelevant for the issue being considered, then respondents are asked to put a weight of zero to such factors. An appropriate length for the units of weights has to be selected--not too long or not too short. I selected a length of weight from zero to ten. An example is given in the next section.

An Empirical Investigation

I applied this approach to measure attitude toward abortion among a group of respondents at a university in the Southeast. The respondents consisted of graduate students, staff, and faculty. In Fall 1996, 111 respondents completed an instrument, which included 38 items in addition to the items on demographic data. Of the 38 items, stems were given for 35 items and the other 3 items were provided without stems for respondents, if they preferred, to include additional factors. The survey instrument provided the following information for the respondents:

> There are many reasons why people decide to support or oppose abortion. Please look at each of the following factors and consider the amount of influence it would have on your decision to support or oppose abortion. Mark the box to indicate whether it would influence you to be **for** or **against** abortion and then mark the amount of weight you would attach to each factor in making your decision, with 1 being the lowest and 10 being the highest. (Two units indicates twice the amount of

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weight than one unit, three units indicate one unit of weight more than two units or three times the weight than one unit of weight, and so on) If a particular factor would not influence your decision one way or another, please mark zero (0)

The instrument included items similar to the following

1. My religion

1	2	3	4	5	6	7	8	9	10		for		against

2. My political affiliation

1	2	3	4	5	6	7	8	9	10		for		against

3 The woman has the right to decide

1	2	3	4	5	6	7	8	9	10		for		against

4 The pregnancy was unplanned

1	2	3	4	5	6	7	8	9	10		for		against

5 Someone has agreed to adopt the baby

1	2	3	4	5	6	7	8	9	10		for		against

To analyze the data, first an ASCII data file was created The data file included 52 variables and 111 cases

Of the 52 variables, 45 variables represented factors that may influence a respondent's attitude toward abortion. (Those forty-five items consisted of 35 items defined in the instrument plus another ten items identified as unique items selected from the items added by the respondents.) The other seven variables represented respondents' demographic information. Second, a program file was created to derive the required data structures for data analyses using SAS© statistical software 6.10 for Windows©.

Two respondents might consider a particular factor to influence their decisions in opposite directions. Similarly, different respondents might attach different weights to any given factor depending on their life experience. Frequency distributions of responses for each item affirm this phenomenon. In all likelihood, some factors may exhibit skewed frequency distributions of weights either positive or negative. For example, as expected, the frequency distribution of weights for item #1, *my religion*, has a highly, negatively-skewed distribution. For each respondent, d_+ and d_- were calculated by adding up all the positive weights and all the negative weights respectively. Finally, d_+ and d_- were added to derive the respondents' raw scores. The results are summarized in Table 1.

Table 1 appears about here

As the Shapiro-Wilk test statistic in Table 1 shows, the raw scale scores are normally distributed. Furthermore, the raw scale mean of 2.9 is not statistically significantly different from zero, as shown by the t test statistic. The zero mean indicates that the middle of the scale is *neutral* because the value zero means

that O_i: $d_{+} = d_{-}$ I. e., the sum of the weighted positive pieces of evidence is equal to the sum of weighted negative pieces of evidence. The middle of the scale is in fact *neutral*. The place where O_i belongs in the continuum of the attitude scale is quite clear--an issue which has been debated for quite some time (Thurstone, 1928; Rosenberg, Izard & Hollander, 1954; Comorita, 1963; Diab, 1965; Worthy, 1969; DuBois & Burns, 1975, 1977; Guy & Norvell 1977; Hofacker, 1984; This Author, 1996). The sample statistics show that attitude toward abortion represents a continuum with a minimum value of -330 and a maximum value of 283. Generally, the length of the scale depends on the number of elements, X_j applicable for the issue being considered. Higher negative values of raw scores show that a respondent's attitude is strongly *anti-abortion*, while higher positive values of raw scores indicate that a respondent's attitude is strongly *pro-abortion*. The frequency distribution of the raw scores is given in Figure 1.

Figure 1 appears about here

As revealed by the Shapiro-Wilk test statistic the sample scores are taken from a normally distributed population. This makes it possible to analyze the scale data using parametric statistical procedures. Once the raw scores are standardized, a transformed scale with an appropriate mean and a standard deviation can be derived. For illustrative purpose, I derived a transformed scale of attitude toward abortion using a mean of 100 and a standard deviation of 15. The transformed scale distribution is shown in Figure 2. Now, for a raw score of a respondent, a scale value on the attitude continuum can be calculated and the exact location of the respondent on that continuum can be identified. Once the attitude scale is standardized and/or transformed, the distribution can be divided into any number of categories as needed: percentile, decile, stanine, quartile, etc. Furthermore, if one so desires, standardized and/or transformed scale

can be divided into traditional attitude categories such as: strongly disagree, disagree, neutral, agree, and strongly agree.

Figure 2 appears about here

In summary, this approach to attitude scaling moves away from the traditional approach to attitude measurement, which is based on expressed opinions of respondents on a collection of declarative statements. Instead, this approach uses the respondents' decision-making process as the basis for measuring their attitude toward any given issue or topic. With this method 1) respondents are not required to decide whether and/or the degree of agreement or disagreement with a declarative statement; 2) the attitude scale represents a rational decision-making approach; 3) the attitude scale takes into account an individual respondent's life experience--the basis on which attitudes are formed; 4) the scale derives the continuum of the attitude being examined; 5) the middle of the scale is, in fact, neutral when the respondents' attitude is normally distributed. (In all likelihood, an attitude toward a given issue or topic among the population can be distributed normally.); and 6) the level of attitude among respondents can be compared. I do not claim that this method of attitude scale construction is universally applicable to measure any construct. One has to make sure that this approach is appropriate for the construct to be measured. Further research on this approach is encouraged to examine the applicability of this approach to measure attitude on various types of issues and topics and on calibrating relevant attitude continua.

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Table 1

Descriptive Statistics of Attitude Toward Abortion Scale (Raw Scores)

Indicator	Value	P
N	111	
Minimum	-330	
Maximum	283	
Mean	2.9	
Standard Deviation	138.4	
t: Mean = 0[1]	0.224	0.8235
W: Normal[2]	0.9557	0.0052*

Note 1 = Testing the null hypothesis that raw scale mean is equal to 0; 2 = Testing the null hypothesis that the sample was not drawn from a normally distributed population, Shapiro-Wilk test; * = $p < 0.05$.

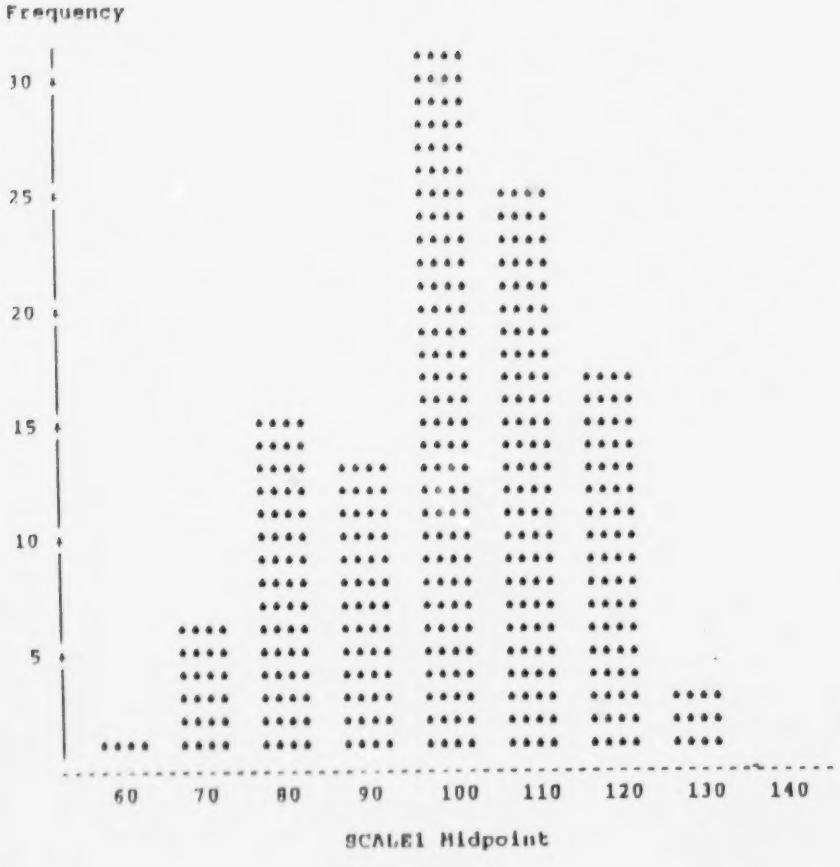
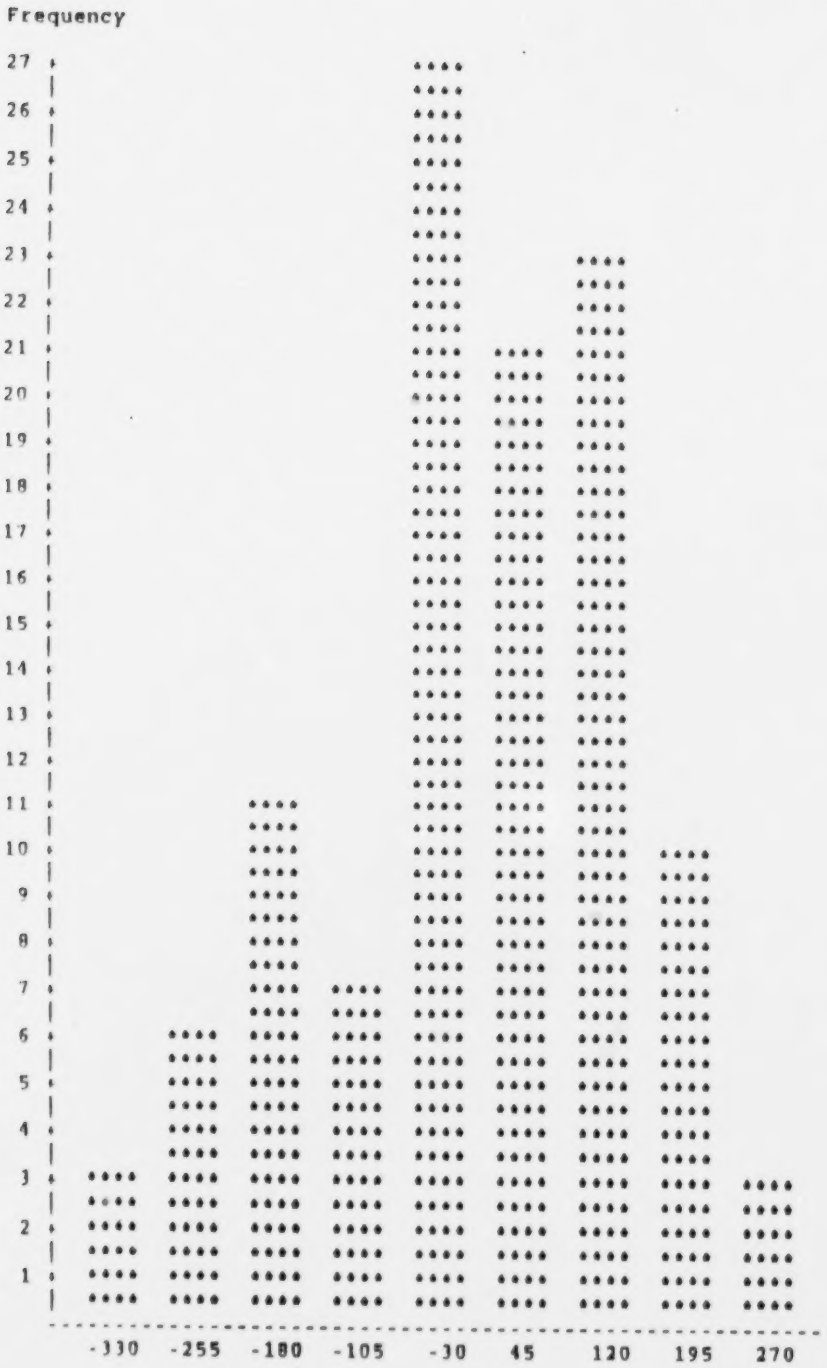

Frequency
30
25
20
15
10
5
60
70
80
90
100
110
120
130
140
SCALE1 Midpoint

Figure 1


Frequency
27
26
25
24
23
22
21
20
19
18
17
16
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14
13
12
11
10
9
8
7
6
5
4
3
2
1
-330
-255
-180
-105
-30
45
120
195
270

Figure 2